What Is Claimed Is:

1. A gas sensor for detecting a physical property of a measuring gas, comprising:

a first solid electrolyte layer;

a second solid electrolyte layer; and

a diffusion barrier arranged between the first solid electrolyte layer and the second solid electrolyte layer, wherein the diffusion barrier has a portion with a concave cross-sectional profile between the first and the second solid electrolyte layers.

2. The gas sensor of claim 1, wherein the sensor is configured to detect an oxygen concentration in the measuring gas.

3. The gas sensor of claim 1, wherein the portion with a concave cross-sectional profile lies in a layer plane in a central region between the first and the second solid electrolyte layers.

4. A gas sensor for detecting a physical property of a measuring gas, comprising:

a first solid electrolyte layer;

a second solid electrolyte layer; and

a diffusion barrier arranged between the first solid electrolyte layer and the second solid electrolyte layer, wherein the diffusion barrier includes a first area and a second area, the first area lying in a first plane positioned between the first and second solid electrolyte layers, the second area lying in a second plane between the first and second solid electrolyte layers and covering one of the first and the second solid electrolyte layers, and wherein the first area is smaller than the second area.

5. The gas sensor of claim 4, wherein the sensor is configured to detect an oxygen concentration in the measuring gas.

6. The gas sensor of claim 5, wherein the first area lies in a central region between the first and the second solid electrolyte layers.

7. The gas sensor of claim 4, wherein a smallest cross-sectional area of the diffusion barrier lies in a central plane extending parallel to, and between, the first and the second solid electrolyte layers.

8. The gas sensor of claim 1, wherein the diffusion barrier is hollow cylinder-shaped, and wherein the first solid electrolyte layer includes a gas access opening to connect the diffusion barrier to the measuring gas outside the sensor element.

9. The gas sensor of claim 8, wherein the portion with a concave cross-sectional profile is arranged on at least one of an outer and an inner lateral surface of the hollow cylinder-shaped diffusion barrier.

10. The gas sensor of claim 8, wherein the gas access opening has a diameter of 0.2 to 0.4 mm, and wherein an inside diameter of the diffusion barrier, in a region of the portion with a concave cross-sectional profile, is greater than the diameter of the gas access opening by 0.05 to 0.2 mm.

11. The gas sensor of claim 10, wherein the gas access opening has a diameter of 0.3 mm.

12. The gas sensor of claim 10, wherein an inside diameter of the diffusion barrier, in a region of the portion with a concave cross-sectional profile, is greater than the diameter of the gas access opening by 0.1 mm.

13. The gas sensor of claim 8, further comprising:

a hollow cylinder-shaped measuring gas chamber bordered by the first and second solid electrolyte layers and configured as a cavity to surround the diffusion barrier.

14. The gas sensor of claim 13, wherein a volume of the measuring gas chamber is larger than a volume of the diffusion barrier by a factor of 3 to 7.

15. The gas sensor of claim 13, wherein a volume of the measuring gas chamber is larger than a volume of the diffusion barrier by a factor of 4.

16. The gas sensor of claim 8, further comprising:

a first electrode that is reachable by the measuring gas present outside the sensor element, through the gas access opening and the diffusion barrier.

17. The gas sensor of claim 16, wherein the first electrode in the measuring gas chamber is arranged on the first solid electrolyte layer.

18. The gas sensor of claim 16, further comprising:

a second electrode arranged on the second solid electrolyte layer in the measuring gas chamber on a side lying opposite to the first electrode.

19. The gas sensor of claim 1, further comprising:

a heating device having a heater and a heater insulation, the heater insulation electrically insulating the heater from surrounding solid electrolyte layers.

20. A method for manufacturing a planar sensor element in a gas sensor for detecting a physical property of a measuring gas, comprising:

applying a first layer made of a paste containing a

pore-forming material onto a first blank foil;

applying a second layer made of the paste containing a pore-forming material onto the first layer;

laminating the first blank foil together with a second blank foil to create a composite; and

sintering the composite to volatilize the pore-forming material in the first layer and the second layer, whereby the first layer and second layer form a diffusion barrier.

21. The method of claim 20, wherein the first layer forms a first section of the diffusion barrier after sintering, and the second layer forms a second section of the diffusion barrier after sintering, and wherein the diffusion barrier has a portion with a concave cross-sectional profile between the first and second section.

22. The method of claim 20, wherein the first layer forms a first section of the diffusion barrier after sintering, and the second layer forms a second section of the diffusion barrier after sintering, and a first planar section between the first and the second sections of the diffusion barrier is smaller than a second planar section of the diffusion barrier that contacts one of the first and the second solid electrolyte layers.

23. The method of claim 20, further comprising:

applying a first electrode-forming electrode paste to the first blank foil after sintering, prior to applying the first layer made of the paste containing the pore-forming material;

applying a cavity-forming paste over the electrode paste, prior to applying the second layer made of the paste containing the pore-forming material; and

applying a second electrode-forming electrode paste to the cavity-forming paste, after sintering.